In the Office Action, the Examiner instructed the Applicants to "amend page 1 ... to reflect that this instant application is a continuation of 09/138,130 ..." Applicants would gladly comply, however, Applicants believe that both the -a- page and Utility Patent Application Transmittal for the instant application contain this information. Applicants are including a copy of the -a- page and two-page "Utility Patent Application Transmittal" as filed to confirm this fact. If these copies differ from the Examiner's folder, Applicants respectfully request that the Examiner contact the Applicants so they may resolve this issue.

Rejection of Claim 1 under 35 U.S.C. § 112.

In the Office Action dated March 5, 2001, the Examiner rejected claim 1 as being indefinite because the Applicants "failed to disclose the relative proportion of (a) to (b), the boiling range of (a) and of (b) and the chemical and physical characteristics of (a) and (b) for the contents of S, N, aromatics, paraffins, naphthene, etc.". The Applicants must firmly disagree.

The relative proportion of the two components is not indefinite. It is clearly designated as any combination of the two components such that the final blended material has greater than or equal to 2 ppm sulfur by weight. Thus one skilled in the art would easily be able to determine the necessary proportions between the two components. Likewise, the boiling ranges of the two components is defined. One of ordinary skill in the art understands the terminology C_8–700°F as designating a well known and commonly used distillation boiling point fraction.

Finally, claim 1 is not indefinite because it fails to give the chemical characteristics of the two components. One of ordinary skill in the art certainly knows the chemical properties

for the boiling point fractions of Fischer-Tropsch product and virgin distillate designated by the claim. Indeed, the only limiting chemical property is the sulfur content of the virgin distillate. The Application clearly states that a Fischer-Tropsch product would contain minimal sulfur as it is a poison to the catalyst. Since the sulfur content of the final blend is know, the sulfur content of the virgin distillate is determined by the blend ratio.

Rejection of Claims 8-9 under 35 U.S.C. § 112.

The Examiner rejected claims 8 and 9 because it was unclear how "petroleum derived distillate" differed from "virgin distillate" in claim 1. Applicants agree with the Examiner and have canceled claims 8 and 9.

Rejection under obvious-type double patenting

In the Office Action, the Examiner rejected claims 1-9 under provisionally obvious-type double patenting in view of Applications 09/138,130, 09/464,179 and 08/971,254. Further, the Examiner rejected claims 1-9 under obvious-type double patenting in view of U.S. Patents 5,689,031, 5,766,274 and 5,807,413. The Applicants respectfully transverse these rejections.

The present application is not obvious in light of U.S. 5,689,031, U.S. 5,776,274, U.S. Application 09/464,179, U.S. Application 08/971,254 nor U.S. 5,807,413 for similar reasons. Each of these prior art references teach the blending of a more desirable product having

superior properties with a less desirable product deficient in those properties to improve the quality of that property in the final blend.[1]

However, the present invention teaches a diametrically different principle. The present invention teaches the blending of a virgin distillate product (having less desirable oxidation stability properties) with a Fischer-Tropsch product (having more desirable oxidation stability properties) unexpectedly improving the stability properties of the Fischer-Tropsch product. Specifically, the present invention has unexpectedly shown that, with respect to fuel oxidation and these components, blending a less stable product with a more stable product actually enhances the long term oxidation stability of the more stable product.

Oxidation stability is composed of two distinct but equally important parts. The first factor is oxidation resistance, or the natural ability of a fuel not to commence the oxidation

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[1] U.S. 5,689,031 blends a product with better lubricity with that of lesser lubricity to improve the lubricity of the final diesel product. Specifically, the unhydrotreated 500-700°F cut of a Fischer-Tropsch product has enhanced lubricity because of the entrained oxygenates. This is blended with the less lubricious hydrotreated result of the 700+ cut and the C_5-500 cut. Thus, a better product is blended with a worse product to improve the properties of the worse product.

U.S. 5,766,274 blends a product with better lubricity with that of lesser lubricity to improve the lubricity of the final jet fuel product. Specifically, the unhydrotreated C_5-450°F cut of a Fischer-Tropsch product has enhanced lubricity because of the entrained oxygenates. This is blended with the less lubricious hydrotreated result of the 450-700+°F cut. Thus, a better product is blended with a worse product to improve the properties of the worse product.

Application U.S. 09/464,179 blends a product with better lubricity with that of lesser lubricity to improve the lubricity of the final diesel product. Specifically, the unhydrotreated 500-700°F cut of a Fischer-Tropsch product has enhanced lubricity because of the entrained oxygenates. This is blended with the less lubricious hydrotreated result of the 700+ cut and the C_5-700 cut. Thus, a better product is blended with a worse product to improve the properties of the worse product.

Application 08/971,254 is a continuation of 08/544,345 which issued as U.S. 5,689,031, which is described above. While the metes and bounds of the claims are different between the two applications, the foundation principle is the same. Therefore the arguments concerning U.S. 5,689,031 apply to this Application as well.

U.S. 5,807,413 blends two portions of the Fischer-Tropsch product before hydrotreating to produce the correct volatility for diesel fuel after hydrotreating. The 500-700°F cut of the Fischer-Tropsch product is blended

process. Oxidation requires that a free radical oxygen ion disrupt the stability of the hydrocarbon bond and substitute itself for the hydrogen atom. Chemistry fundamentals teach that different configurations of hydrocarbons are more susceptible to this initial attack. Therefore a straight chain paraffin has a lower free energy toward oxidation (is more stable) than a branched paraffin. Similarly, a branched paraffin has a lower free energy toward oxidation than an aromatic. Thus a Fischer-Tropsch fuel, which by its nature is mostly straight chain paraffins, shows good oxidation resistance.

However, there is a second, and equally important factor to oxidation stability - oxidation inhibition. Oxidation inhibition is the ability of a fuel to stop the oxidation reaction once it has started. Again, chemistry fundamentals aid our discussion. Free radical reactions either propagate or terminate. An example of a terminating free radical reaction in fuel is that an aromatic can easily reconvert from its radical state to a stable state because of its low energy of conversion. Similarly, hetero-atom impurities (such as sulfur or nitrogen compounds), which are inherent in natural fuels but absent in Fischer-Tropsch fuels, will terminate free radical reactions.

After the Fischer-Tropsch fuel's high oxidation resistance is overcome, paraffins, the main component of Fischer-Tropsch fuels, form peroxides. Peroxides themselves are quite reactive and propagate readily to form further peroxides. Therefore, although highly resistant to the initial onset of oxidation (oxidation initiation), once the process starts in a Fischer-Tropsch fuel, it rapidly escalates because the components of a Fischer-Tropsch fuel enhance free radical propagation rather than terminate it.

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with the 700+°F product prior to hydrotreating. Thus, a better product (for volatility) is blended with a worse product to improve the properties of the worse product.

Fresh Fischer-Tropsch products always show far better oxidative stability than virgin distillate products as its oxidation resistance is order of magnitudes better. However, the present invention has discovered that by blending a less stable product (the virgin distillate) with the more stable product (the Fischer-Tropsch product), the long term oxidation stability of the Fischer-Tropsch product is enhanced. One would expect the opposite. That is, blending a less stable fuel with a more stable fuel would degrade the stability of the more stable fuel. But because the less stable fuel brings hetero-atom compounds which inhibit oxidation once it has started, it actually improves the stability of the more stable Fischer-Tropsch product.

The present invention, also, is not obvious in light of Application 09/138,130 which has matured to patent U.S. 6,180,842 B1. The '842 patent claims a similar invention, but limits the percentage of virgin distillate to 1-40%. The current invention unexpectedly found that these limitations could be expanded to include the whole range of possible mixtures, so long as the final sulfur ppm was greater than or equal to 2 ppm. The Applicants provide further evidence of this provided in the § 132 Affidavit submitted herewith by Paul Berlowitz.

One of ordinary skill in the art would expect a linear response when blending two components, one with superior properties, the other deficient in those properties. But, as can be seen from the § 132 affidavit, blending greater than 40% virgin distillate with a Fischer-Tropsch product still improves the stability of the blended product far more than the expected linear improvement. Thus, the present invention is not obvious in light of the '842 product because it shows unexpectedly improved properties not suggested by the '842 patent.

Applicants have demonstrated that the present invention is not obvious in light of any of the prior art cited by the Examiner. Applicants respectfully request that the Examiner reconsider and approve these claims in light of these arguments.

Respectfully submitted,

Norby L. Foss
Attorney for Applicants
Registration No. 47,571
Telephone No. (908) 730-3644

[X] Pursuant to 37 CFR 1.34(a)

ExxonMobil Research and Engineering Company
(formerly Exxon Research and Engineering Company)
P. O. Box 900
Annandale, New Jersey 08801-0900

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